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RANCH ORGANIZATION AND OPERATION

in the

NORTHERN GREAT PLAINS REGION

1927

(Preliminary Report)

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THE HISTORY OF THE

REIGN OF

CHARLES THE FIRST
BY
JOHN BURNET
OF LINCOLN'S INN
ESQ.
IN TWO VOLUMES.
LONDON, Printed by J. Streater, at the Sign of the Gun, in St. Dunstons Church-yard, 1680.

THE SECOND VOLUME.

THE FIRST PART.	1
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Printed by J. Streater, at the Sign of the Gun, in St. Dunstons Church-yard, 1680.

RANCH ORGANIZATION AND OPERATION IN THE NORTHERN GREAT PLAINS REGION

(Preliminary Report)

Situation from 1924 through 1927. The situation of the cattlemen in the NorthernGreat Plains region in 1924 showed little improvement over the previous 3 years when considered from the standpoint of prices received for range cattle. The heavy movement to market which began in 1920 and which was influenced in most parts by financial pressure was continued through 1924, 1925 and 1926.

In addition to the comparatively low prices of cattle during this period, the cost of commodities which the ranchmen must buy remained high, and resulted in a high percentage of indebtedness against ranching property. This condition represented the usual situation among ranchmen up to the beginning of 1927.

Present Situation. It seems probable that the cattle industry is now at the low point of the present production cycle and conditions in many respects are now similar to those existing in the beginning of 1913. These cycles usually extend over a period of 14 to 16 years. Previous low points in production occurred in 1898 and 1912. It is expected therefore, that from now on the trend of production will be gradually upward for several years to come. Present relatively small numbers of cattle in the country together with relatively high prices which have prevailed for several months, will undoubtedly result in restocking of farms and ranges.

Cattle numbers in the United States continued to decrease during 1927. The estimated number on farms January 1, 1928 was 55,696,000 head which was 2% smaller than on January 1, 1927. This was the smallest number of cattle on farms and ranches since 1912 and probably the second smallest since 1898. With the exception of 1921, total slaughter of cattle and calves each year since 1917 has exceeded the number of calves born. The number of 2-year old steers per hundred yearlings on farms and ranges on December 1, 1927 declined from 83 in 1926 to 72 in 1927. The number of calves per hundred cattle increased slightly. The most significant decreases in the number of cattle were in the North Central states which furnishes the bulk of the cattle slaughtered east of the Missouri river. In Texas and the southwest, marketing of cattle and calves increased in 1927.

The first clear intimation of reduced basic supplies consisted of a sharp reduction of marketings of range cattle during the fall of 1926, the situation was obscured somewhat by heavy marketings of fed cattle during the first half of 1927 but a marked reduction in supplies after the middle of 1927 confirm the earlier judgment beyond any doubt. This trend toward lighter marketings and slaughter is expected to continue throughout 1928 and result in a 6 to 10 per cent reduction in the number of cattle and calves marketed during the year.

Outlook Situation. From the long time viewpoint the cattle situation appears favorable. Since an increase in cattle numbers will not materially increase market supplies until late in 1930 or 1931 cattle prices are expected to remain on a fairly high level during the next three or four years. Demand for beef in 1928 may be somewhat less than in 1927 because of the relatively high price of beef compared with other meats. If the demand for beef in 1928 does fall below 1927, it is not likely that such reduction will off set the expected decrease in market supplies. Average cattle prices therefore, are expected to be somewhat higher in 1928 than in 1927 although the peak prices of 1927 may not be exceeded. Trends of cattle production over the United States during the next few years should be carefully observed by the ranchmen.

Range Cattle Survey. In 1925 the Agricultural Experiment Stations of North Dakota, South Dakota, Montana and Wyoming, in cooperation with U. S. Department of Agriculture made a survey of cattle production in the Northern Great Plains region. In 1926 a more detailed study was established by the above agencies and limited to 60 cooperating ranchmen who are supplying, confidentially, detailed information pertaining to the organization and operation of their ranches and results from such operations.

The data obtained covering ranch operations in 1924, 1926 and 1927 show that ranchmen made a return of 3.1% on investment in 1924, 5.1% in 1926 and 11% in 1927. During the year of 1927 the prices of range cattle of various classes increased 50 to 75 per cent over the prices that prevailed January 1 of the same year. As a result of the rise in prices, cattle on hand at the end of the year were worth about \$7700 more per ranch than they were worth at prices prevailing on January 1, 1927. The increase of \$7700 is in addition to the 11% return on investment realized from the year's operation.(1)*

While operations in 1927 returned a higher average on investment than during the preceeding year, many ranches, even under these favorable market conditions, failed to receive a satisfactory return on capital investment.

Of the 49 ranches summarized in this report two sustained a loss. Eight others made less than 5% on investment. Fifteen ranches made from 5 to 10 per cent on investment. Fifteen made from 10 to 15 percent and the balance made over 15 per cent.

The poor returns on some ranches as contrasted with the excellent returns on others were due in some cases to sales early in the season that did not reflect the higher prices that prevailed later but were due in most instances to the size of business being too small to provide sufficient income to meet the necessary operating expenses which are usually high in proportion to the income on the smaller outfits.

Organization and Management Problems. In order to receive the benefit offered by the improved market conditions some ranchmen may well afford to give further consideration to organization features and management practices on their ranches, as determined from other ranchmen's experiences

The difference between receipts and expenses *(2) is a figure of vital interest to ranchmen, since in the long run, it is the amount that the business makes available for family living, payment of debts and accumulation of capital.

On one of the ranches the expenses were greater than the receipts as may be observed in Table 1. Nine ranches received less than \$2500 above expenses, 22 ranches received from \$2500 to \$5000. The receipts for the remaining 17 ranches were above \$5000 per ranch.

*(1) The return on investment is computed on the total ranch investment on Jan. 1, 1927, but does not include the increase in value of range cattle on hand Dec. 31, 1927, due to the rise in cattle prices (\$7700) per ranch. It does include, however, all returns actually realized on cattle sold. The return on investment with cattle inventoried at current market prices on both Jan. 1, 1927 and Dec. 31, 1927 would have been 30%.

*(2) Receipts include sales of livestock, livestock products, crops and increases in inventory during the year. Expenses include cash operating expenses, depreciation on improvements, machinery and equipment, value of unpaid family labor used on the ranch and purchases of livestock but does not include the value of the operator's labor.

Table I--Ranch Incomes

49 Ranches, Northern Great Plains Region, 1927

Receipts less Expenses	:	No. Ranches
Loss	:	1
0 to \$2499	:	9
\$2500 to \$4999	:	22
\$5000 to \$7499	:	9
\$7500 to \$9999	:	4
\$10,000 or over	:	4

Average Ranch Income for 49 Ranches--\$5533.

Some of the ranchmen whose balances between receipts and expenses were low in 1927 could improve their incomes by better organization and management of their present resources. But some of the ranches covered in this study, in common with many others in this region, are so small that, even with the most effective organization and management under the present comparatively favorable market conditions can scarcely be expected to return incomes large enough to afford a satisfactory living for the family and permit a reasonable accumulation of capital. The study of the smaller ranches individually indicates that a ranch carrying 100 breeding cows is necessary to yield an income of \$2500 when efficiently operated, and yearlings are sold, and no other sources of receipts than sale of cattle are available.

Requirements of Hay, Crops and Range Land. Facilities for winter feed production are essential to cattle production in this region. Native hay land and land devoted to field crops are the contributing sources.

The acreage of hay and crop land per head of cattle carried is shown in Table 2. Examination of the individual records having less than one half acre of hay and feed crops combined per head of cattle shows the comparatively low ratio of acres of crops to numbers of cattle to be attributable to (1) carrying market cattle to long ages, three and four years old, (2) use of cottonseed cake for wintering in addition to roughage and (3) use of grain in addition to roughage.

The ranches having 2 acres and over of hay and feed crop land per head of cattle carried are characterized by (1) additional production of cash grain crops, such as wheat, flax and rye (2) production of hogs that largely utilize the feed grains such as barley, speltz and oats (3) production of pure bred beef cattle and carrying dairy cattle and (4) selling market cattle at one and two years old.

Table 2. Acres of Hay and Feed Crop Lands per Head of Cattle.

49 Ranches, Northern Great Plains Region, 1927.

Acres of Feed Crops per Head	:	Number of Ranches
Less than .25	:	1
.25 to .49	:	10
.50 to .74	:	8
.75 to .99	:	11
1.00 to 1.24	:	6
1.25 to 1.49	:	4
1.50 to 1.74	:	2
1.75 to 1.99	:	1
2.00 and over	:	6

Average of 1.24 acres feed crops and hay
per head of cattle on 49 ranches.

The winter feed requirements of various classes of cattle and the proportion each class is of the total cattle carried largely determines the acreage of hay and crop land per head of cattle wintered where minimum amounts of feed are fed. The feed requirements of cattle together with a safety factor in operation, such as a sufficient feed reserve, establish certain ratios between the acreage of crop land, including hay land, that yields three-fourths tons per acre and the total numbers of cattle carried. Under the different maximum ages at which cattle are sold the ratios are:

All sold as calves	1.3 a. per head of all cattle
All sold as yearlings	1.0 a. per head of all cattle
All sold as two's	1.0 a. per head of all cattle
All sold as three's	.75 a. per head of all cattle

The above ratios are determined from situations where all feed fed is produced on the ranch. A system of operation observing the above ratios of feed production in relation to the numbers of cattle carried will minimize the risk of death losses during severe winters. In addition, feed reserves may be built up and maintained to the extent of a year's supply of feed on hand at all times.

With the requirement of grazing land at 15 to 30 acres per head of cattle excluding calves, as estimated by ranchmen and exemplified by the normal rate of stocking on some ranches of definitely known acres of grazing land being used, the proper balance of the two classes of land are reliably determined under the various conditions that prevail. Wide variations in the quality of the grazing land will necessitate a wider ratio between the two classes of land.

Whether or not the grazing land is owned, leased or used free of charge, does not alter the fact that a liberal acreage of grazing land must be available in connection with land that is producing feed.

Control of Land. The control of land is essential to stable organization of ranching property. Without stable organization, the plan of operation must be changed to meet new organization conditions that may occur. The classes of land and length of time for which use may be procured are: (1) forest range with 10 year permits, (2) state owned land with 5 year lease contracts, (3) privately owned land with 1 to 5 year lease contracts with privilege of sale reserved and (4) limited areas of public domain. The stability of an organization consisting of owned land operated in connection with either of the above classes of land is in the same order as mentioned.

Ordinarily a relatively higher percentage of the crop land is owned than leased. Comparatively few instances prevail where all crop land is leased. On the other hand few instances prevail where all of the grazing land is owned. Approximations on the percentage owned of all grazing land operated are shown in Table 3.

Table 3. Proportion of Grazing Land Owned.

49 Ranches, Northern Great Plains Region, 1927.

Per Cent of Grazing Land Owned	:	No. Ranches
None	:	6
1 to 19	:	11
20 to 39	:	22
40 to 59	:	6
60 and over	:	4

While lease of all land operated as shown by six ranches in Table 3 offers advantages in eliminating the overhead expense of land ownership, little or no permanence can be attached to such an organization. Lease prices of grazing land may be expected to follow the upward trend in cattle prices. Further, competition for such leases may be expected, especially for desirable tracts.

The consolidation of acreages of grazing land into operation units of suitable size, because of the wide ownership of comparatively small tracts of land, remains the major problem of ranching in the region. Not until the present situation changes so that ranchmen can more easily acquire control of lands which they operate, will the various communities and the ranchmen themselves receive the benefits of a firmly established industry.

Combining Other Sources of Income With Cattle. The relative importance of the principal enterprises on all the ranches is shown in Table 4. The amounts shown as net increases are the gross receipts less the total expenses. In this instance total expenses do not include operator's labor nor purchases of livestock. Livestock purchases ordinarily are an additional investment of capital.

Table 4. Relative Importance of Major Enterprises

49 Ranches Northern Great Plains Region, 1927.

Enterprise	:No. Ranches : :Reporting :	Net Increase *		Income Per Ranch
		Dollars	Per Cent	
Range Cattle	: 49	: 306,000	: 69.5	: 6245
Cash Crops	: 27	: 52,700	: 11.9	: 1951
Feed Crops	: 41	: 51,600	: 11.7	: 1257
P. B. Cattle	: 6	: 13,600	: 3.1	: 2267
Hogs	: 19	: 10,400	: 2.4	: 547
Sheep	: 2	: 6,100	: 1.4	: 3050
Totals	: 49	: 440,400	: 100	: 8976

*Footnote--The net increase is determined by adding the closing inventory values to the sales and from the sum subtracting the opening inventory values plus the purchases.

Some of the ranches had returns from range cattle only. On others there were several additional sources of income. On one of the small ranches the net increase in range cattle was \$2100 and in hogs \$100 with no other sources of returns. Contrasted with the above is another ranch of comparable acreage and capital investment on which the net increases in the various enterprises were: range cattle \$2500, feed crops \$2200, cash crops \$1500 and hogs \$600. The cause of the differences in these two instances was due primarily to the fact that 250 acres of good farming land was available and being operated on the latter as compared to only 70 acres of farming land available on the former ranch. A further example of extensive crop production is offered by a comparatively large ranch. The net increase from range cattle in this instance was \$5700, from feed crops \$3000 and from cash grain crops \$11,400. In this instance the cattle enterprise consisting of approximately 350 head is fitted into the farming enterprise in that the by-products of the grain farm are utilized by cattle.

Calf Crops. The principal factors that influence calf crops as determined by ranchmen are (1) condition of the breeding herd, bulls especially, (2) range conditions as reflected or association with conditions of the breeding herd (3) size of breeding pastures (4) topography of the range used during the breeding season (5) prevalence of contagious abortion in the herd and (6) impotent bulls. Of the factors mentioned, contagious abortion is probably the most difficult to overcome and impotency of bulls is the most difficult to detect especially where a number of bulls are used. Poor condition of bulls can be overcome by liberal use of grain. Good bulls command good prices. If they are not put into good serviceable condition for the breeding season their value is greatly impaired.

Table 5. Per Cent Calf Crops

43 Ranches, Northern Great Plains Region, 1927

Per Cent Calf Crops	No. Ranches
40 to 49	2
50 to 59	3
60 to 69	8
70 to 79	17
80 to 89	12
90 and over	1
Total	43

Situations prevail that offer opportunities for pasture breeding which is advocated as a means of increasing the calf crop over the use of open range or very large pastures. This advantage may be utilized to that end in a number of instances observed.

There is little basis for the more or less prevalent opinion that it is not as important to ranch income to obtain a high percentage calf crop on ranches that are selling three year old steers as on those selling calves or yearlings. The opinion is erroneous. For example, the difference between a 60% and 80% calf crop will be 20 calves in the fall for each 100 cows, and will continue to be approximately 20 head, excluding death losses, through the succeeding three years. If three year old steers are being sold the difference at date of marketing will be 10 steers, less any losses suffered.

It is very evident that the cow herd is the class of cattle most expensive to carry on a per head basis, because of the required feed and labor. Cow beef, even though well finished, does not ordinarily command the prices paid for steer and spayed heifer beef of equal finish. These two facts lend strength to the argument that good management necessitates practical efforts to obtain the highest percentage calf crop possible in order to increase the returns from the cow herd.

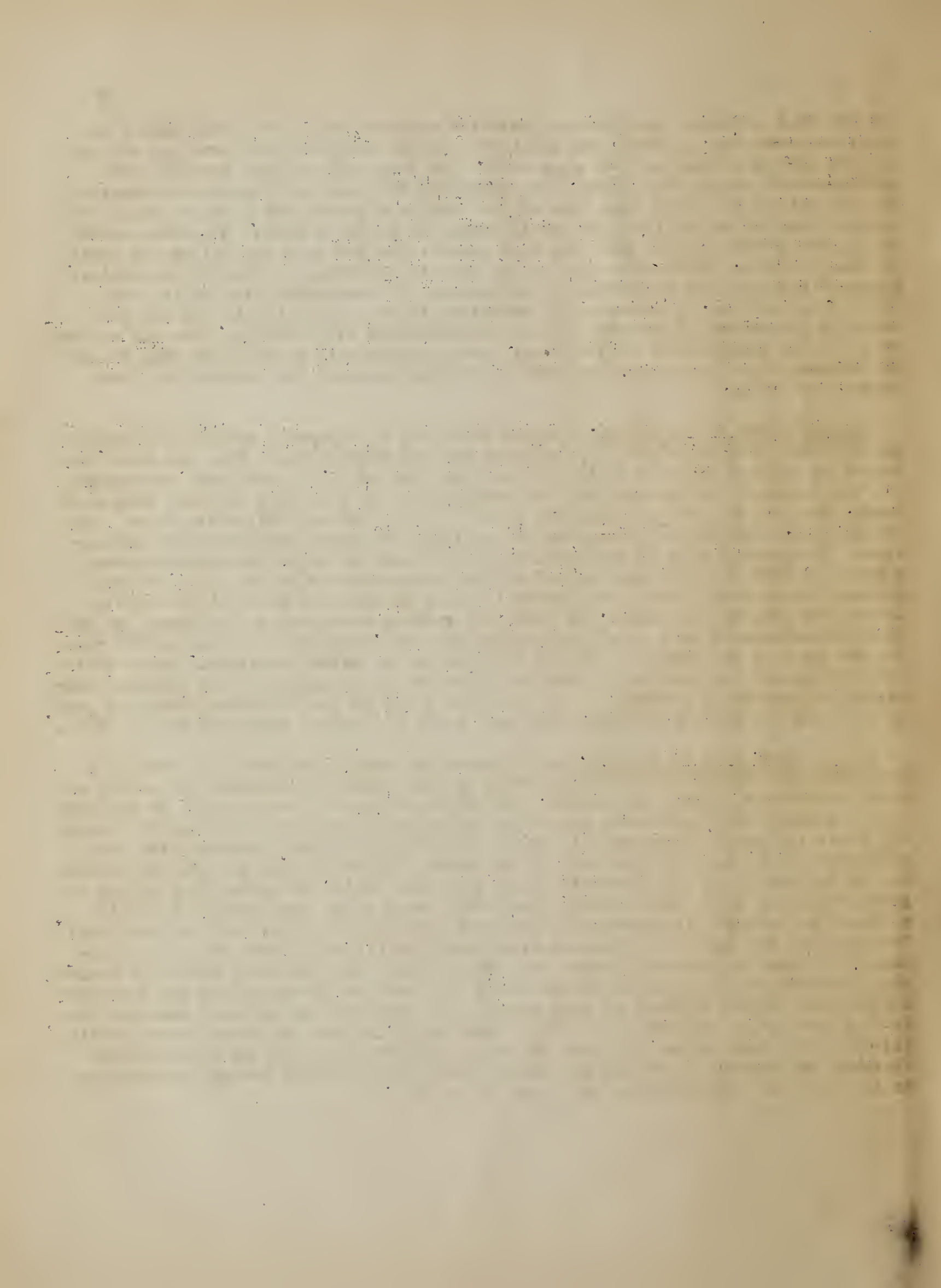
Winter Feeding. The estimated winter feed requirement per cow is generally stated as one ton of hay per head. Comparatively few ranchmen conform to that standard however. Generally, the amount is somewhat less.

Cottonseed cake was used rather extensively in this region during the winter of 1926-27. The price of cottonseed cake was low at that time as compared with other classes of feeds. On one ranch in particular, the system of wintering involved the use of 33 tons of cottonseed cake. The number of cattle on hand on Jan. 1, 1927, was 347 head of which 190 were cows. The total amount of hay and other roughage fed was 145 tons. In addition the cattle were carried on pastures and two pounds of cottonseed cake per head daily was supplied. No grain was fed. The feed cost per head, considering the hay and other roughage at current prices was approximately \$8 per head. As compared to the above another example is offered by

a ranch that produces considerable grain and buys no feed. The total number of cattle on hand Jan. 1, 1927, was 354 head of which 140 head were cows and the remainder were yearlings and two year olds. The feed cost in this instance was approximately \$8 per head, also. Approximately 700 bushels of oats were supplied the 140 calves held over from 1926 at the rate of 2 pounds per head per day, from weaning time in the fall of 1926 until turned to grass in 1927. The advantages of the latter system are (1) avoiding cash expenditure for feed and (2) use of grain in young cattle. Cottonseed cake can be used to advantage in limited quantities, 2 pounds per head per day should be the maximum in connection with native hay, straw or grain hay. Its comparable qualities in feed value to alfalfa hay will scarcely permit use of cottonseed cake in connection with alfalfa. Nor can cottonseed cake be substituted for roughage. Best results will be obtained from the use of cottonseed cake in connection with such feeds as grain hay, native hay, corn fodder and straw.

Grazing Crops by Livestock. Hogging down corn is a popular method of harvesting the crop in specialized areas of corn and hog production in the corn belt. Interest is being manifested in the practice in this area. In addition, one ranchman has developed the unusual plan of using cattle in very much the same manner as hogs. This ranch carries around 500 head of cattle and normally sells three year old steers. Sufficient farmingland is available to permit extensive crop production. The general plan of the operator is to plant an acre of an early maturing variety of corn for each two head of cattle to be marketed in the fall. Before shipment the market cattle are allowed to clean up the corn field which usually takes from four to six weeks. In 1926, the results were very satisfactory and the operator considered that he realized \$1.00 per cwt. additional because of the finish obtained on the market cattle in addition to the gains in weight. Under suitable situations for providing water the practice may be considered by others. Supplying two pounds of cottonseed cake per head daily or five to seven pounds of good quality alfalfa hay may be considered as a means of further improving the practice.

Age at Which to Sell Cattle. Comparatively low prices for three and four year old grass fat steers that prevailed prior to 1927 tended to diminish the supply of those particular classes of cattle. Encouragement was lent to the sale of younger cattle through statements from seemingly authoritative sources that "the day of the big steer is gone." Unfortunately there is no compilation of authoritative data available at the present time that gives information concerning the probable future demand for three and four year old grass fat steer beef. To determine a policy of production that is to extend over a period of years it is very essential for the ranchman to analyze his individual situation with regard to its best adaptability. The study of the individual ranches disclosed that (1) situations where feed production is limited and cheap range that will produce well finished steers is available is conducive to maturing steers (2) that favorable possibilities for feed production and limited acreage of summer range are conducive to carrying comparatively high percentage of cows, all cattle considered, and sale of young feeder cattle, (3) that if mature steers are to be sold they should be of good quality and well finished and (4) that carrying steers to mature ages does not justify inattention to the breeding herd nor poor wintering of calves.



Examples of Ranch Organization and Operation and Suggestions for Improvement.

The different conditions that prevail in the Northern Great Plains Region are responsible for the various representative types of ranch organization. In turn each type of organization presents its own particular problems of operation. Fixed methods of operation can not be set out as equally practical under the varying conditions that prevail. The following suggestions of ranch reorganization and improvement in the methods of operation are based on the experience of ranchmen and farmers who have achieved success in various phases of ranch operation; namely cattle management and crop production.

The actual organization, with some details of operation, of three ranches are offered as examples of prevalent types of organization observed in this study and have wide application in the Region.

Ranch Number 1. This ranch is in good dry land farming district. The owner is a good farmer. He does not own sufficient grazing land to carry the numbers of cattle for which he can produce winter feed. A limited amount of grazing land is available at lease prices that seems to permit its use, especially in connection with the feed production facilities that prevail. In addition, some free range is available.

This type of organization is applicable to communities that offer opportunities in crop production ranging from alfalfa hay to cash grain crops. Ranches of this type and suitably located with reference to shipping points may consider several enterprises as possible sources of income instead of applying all efforts to a single enterprise of crop or cattle production.

The details of the organization and operation in 1927, with notations referring to those phases in 1926 follows.

Land	Farm land	Hay land	Grazing land	Total
Owned Jan. 1, 1927, acres	163	37	200	400
Acquired and used during 1927, acres	150		170	320
Leased Land, acres	50		1410	1460
Totals, acres	363	37	1780	2180

The 1460 acres of land was leased from a private party at 10¢ per acre per annum. The amount of free range used was approximately 1500 acres. The land operated in 1926 consisted of the 400 acres of owned and 1460 acres of leased land together with the available free range.

Livestock Inventories:

	No. Head	Jan. 1, 1927	Purchases	Sales	Losses	Dec. 31, 1927
Cows,		70	-	10	1	76
Yearling heifers	" "	18	-	-	-	29
Bulls	" "	2	2	1	-	3
Yearling steers	" "	19	-	18	1	28
Totals		109	2	29	2	136

One yearling heifer was butchered for home use. The calf crop in 1927 was 58 head or 83 per cent. One calf was lost. The ages of all classes of cattle have been advanced one year between the opening and closing inventories. The inventories of the cattle handled in 1926 were little changed from those shown for 1927.

The calf crop in 1926 was 61 per cent.

Investment:	Jan. 1, 1927	Dec. 31, 1927
Land and Improvements	\$ 5,474	\$ 6,413
Machinery and Equipment	1,335	1,635
Range Cattle	3,888	4,875
Hogs	1,290	488
Horses	290	290
Cash crops on hand	35	1,500
Feed	811	3,006
Totals	<u>\$13,123</u>	<u>\$18,207</u>

The inventory value of the cattle as shown on Dec. 31, 1927, does not take into account any increase in value due to the more favorable market prices that prevailed. But account is taken of increase in value of young cattle due to growth, such as yearlings becoming two's, etc. Allowing the increase in value due to market prices the closing cattle inventory value was \$8775 instead of \$4875.

On January 1, 1926, the total investment was \$13,317 and on December 31, 1926 it was \$13,123, as shown on January 1, 1927 above. The decrease during 1926 was \$194 as compared to an increase of \$5,084 during 1927.

There was no indebtedness against this ranch in 1926 nor in 1927. Cash was paid for the land purchased in 1927. The source of purchase was a county tax deed. The operator borrowed \$150 during the year as operating capital. The rate of interest paid was 10 per cent per annum.

Crops Produced in 1927:

	Acres	Total Yield	Amount fed to	
			Cattle	Hogs
Alfalfa	37	50 tons	30 tons	
Wild Hay	12	20 tons	--	
Oat Hay	15	25 tons	15 tons	
Oats, grain	30	1600 bu.		
Wheat, grain	50	1570 bu.		
Corn, grain	90	2700 bu.	250 bu.	850 bu.
Corn, fodder	--	100 tons	60 tons	
Straw	--	75 tons	20 tons	
Total, acres	<u>234</u>			

The amounts of feed shown as fed to cattle and hogs are for the most part from the 1926 crops and were consumed almost entirely by the cattle and hogs shown in the Jan. 1, 1927 inventory. In 1926, the crop yields from approximately the same acreage were considerably less than those shown for 1927. The total yield in 1926 was 700 bushels of corn, 32 bushels of wheat, 350 bushels of oats, 40 tons of corn fodder and the yield of alfalfa was practically the same each year. Only five acres of wheat was seeded in 1926.

Ranch Receipts in 1927:

Cash sales of:	
Range cattle	\$1600
Hogs	1867
Wheat	73
Total	<u>\$3540</u>

Increased Inventories of:

Range Cattle	\$987
Hogs (minus)	<u>-802</u>

Net increase all livestock	185
Cash crops,	1465
Feed	<u>2195</u>
Total	3660
Total Ranch Receipts	<u>\$7385</u>

In 1926, the cash sales of range cattle amounted to \$1650; hogs \$537 and wheat \$338, making a total of cash receipts of \$2525. The inventories of cattle during 1926 decreased \$67, hogs increased \$1080 making a net increase in livestock inventories of \$1013. Cash crops and feed inventories decreased in 1926 \$864 as compared to the increased inventory of \$3660 in 1927. The \$1465 of cash crops shown for 1927 represents wheat produced and on hand at the end of the year. The increase in inventory of range cattle for 1927 as shown above does not include increases due to the higher market prices.

Ranch Expenditures in 1927:

Cash Operating Expenses:

Feed bought	\$ 22
Labor, incl. board, 10 months	680
Leased land	146
Taxes	152
Gas and oil	250
Threshing and Twine	254
Repairs on Improvements	20
Seed	34
Miscellaneous	<u>117</u>

Total cash expense	\$1675
Depr. on Improvements and Machinery	<u>436</u>
Total Operating Expense	\$2111
Range Cattle Purchased	150
Hogs Purchased	<u>434</u>
Total Livestock Purchased	584

Total	<u>\$2695</u>
Total Ranch Receipts (\$7385) less Total Ranch Expenses (\$2695)	\$4690
Less Operator's Labor	<u>780</u>
Return on Ranch Investment of \$13,123	\$3910
Per cent return on ranch investment (\$3910 divided by \$13,123)	29.8%

In 1926, the cash operating expense was \$1073. The increase of approximately \$600 that occurred in 1927 was due to increases of about \$200 each in the items of labor, gas and oil and threshing. Only \$15 was expended for the purchase of livestock in 1926. The difference between Total Ranch Receipts and Total Ranch Expense in 1926 was \$1268. After deducting the Operator's Labor only \$488 remained as return on Ranch Investment of \$13,317 or 3.7 per cent as compared to 29.8 per cent in 1927.

Suggestions for Reorganization and Operation

Livestock. With the present acreage of owned and leased grazing land and the available free range this ranchman is in a position to carry at least 75 breeding cows. The amount of grazing land available is not sufficient, however, to justify a plan of carrying market cattle beyond the long yearling age. This plan would necessitate the wintering of approximately 140 head of cattle, based on an 80 per cent calf crop. With the farming facilities that prevail, 12 brood sows to produce 75 pigs may well afford to be considered in this instance.

Cropping System. The acreage of alfalfa should be increased to 50 acres, 12 acres of which may be used for hog pasture, and the remainder for hay production. The cultivated land may be increased to 275 acres and the following cropping system applied; 55 acres to corn, 30 acres for hogging down and 25 acres for fodder, 110 acres of wheat for cash crop, 55 acres of sweet clover or grain hay, and 55 acres of oats, barley or speltz. The above crops properly rotated from year to year may be expected to yield as follows: 35 tons alfalfa hay; 55 tons of sweet clover or grain hay; 100 tons of grain straw; 1100 bushels of oats; barley or speltz; 1375 bushels of wheat. The 30 acres of corn to be hogged down should be sufficient to finish the pigs. Additional grain should be supplied the sows. The roughage available for wintering the cattle and horses would be about 190 tons including 100 tons of grain straw.

In order to reduce the hazards of crop production as much as possible the following five year rotation should be adopted.

1- Corn on spring plowing	55 acres, est. yield 20 bu. per acre	1100 bu.
	(30 acres to be hogged, 20 husked.)	
2- Sweet clover and wheat	55 acres, est. yield 15 bu. per acre	825 bu. 40 T.hay
	straw seeded on corn stubble.	
3- Sweet clover hay	55 acres, est. yield 1 ton per acre	55 T.hay
4- Wheat	55 acres, est. yield 10 bu. per acre	550 bu. 30 T.straw
5- Oats, barley or speltz	55 acres, est. yield 20 bu. per acre	1100 bu. 30 T. "
6- Alfalfa not in rotation	50 acres-12 acres-hog pasture	35 T.hay
	<u>305</u>	<u>3575</u> 190 tons

Millet or grain hay may be substituted for sweet clover following wheat.

Returns to be expected.

Cattle sales:

26 long yearling steers @	\$60 per head	\$1560
12 long yearling heifers	50 per head	600
14 dry cows	60 per head	<u>840</u>
Total cattle sales		\$3000

Hog sales:

75 pigs, weight approx. 200 lbs. \$16 per head	1200
--	------

Grain sales:

1250 bushels @ 1.00 per bu.	1250
Total	<u>\$5450</u>
Approximate total operating expense based on 1927 actual operations	<u>2500</u>
Receipts less expense to be expected	<u>\$2950</u>
Receipts less expense in 1926	\$1268
Receipts less expense in 1927	<u>4690</u>
Average for 1926 and 1927	\$2979

the subject of the present paper is the question of the
possibility of a general theory of the structure of the
universe. The question is whether it is possible to
construct a theory which is valid for all scales of
length and all scales of time. The answer to this
question is not yet known. It is one of the most
important problems in modern physics.

The first step in the construction of a general theory
is the construction of a theory of the structure of
the universe. This theory should be able to describe
the structure of the universe at all scales of length
and all scales of time. The second step is the
construction of a theory of the dynamics of the
universe. This theory should be able to describe the
dynamics of the universe at all scales of length and
all scales of time.

The third step is the construction of a theory of the
evolution of the universe. This theory should be able
to describe the evolution of the universe at all scales
of length and all scales of time. The fourth step is
the construction of a theory of the origin of the
universe. This theory should be able to describe the
origin of the universe at all scales of length and all
scales of time.

Ranch Number 2. This ranch is typical of a considerable number of ranches located where wild hay and alfalfa cannot be depended on to furnish the necessary winter feed supply and other feed crops must be raised, such as corn fodder, sweet clover, millet and grain hay.

The principal problems confronting the ranchmen on locations of this kind are those of winter feed production and utilization of the range to the fullest possible extent.

Because of the hazards of crop production due to unfavorable soil and moisture conditions, a diversified system of ranching cannot be recommended.

Grazing land is available at low rental costs and it seems advisable for the ranchman to handle as many cattle as can be wintered by devoting all available crop land to winter feed production.

In order to handle the largest possible number of cattle with a limited feed supply, steers and spayed heifers should be carried to three-year olds.

A feed reserve is most important on ranches of this type and should be maintained to provide against dry seasons.

It may not be possible at all times to maintain a sufficient reserve to winter the normal numbers of cattle handled. This would be particularly true in dry years when little or no feed is produced and the range is short, necessitating more than an average amount of winter feeding. In such seasons, the operator has the choice between purchasing winter feed and selling a part of the herd. The most common, and probably the most profitable, practice is to reduce the herd to the number that can be safely handled with the available feed supply. When steers and heifers are run to 3-year olds this can usually be done without reducing the size of the breeding herd. By selling calves, yearlings, twos and three's; the herd can be reduced to approximately one-third of the number normally wintered.

	Farm land	Hay land	Grazing land	Total
Owned Jan. 1, 1927, acres	240	--	2960	3200
Leased land, acres	---	--	480	480
Totals, acres	240		3440	3680

The 480 acres of land were leased from a private party for \$45 per year. The amount of free range used was 640 acres. In 1926, the farming land operated was 240 acres and the amount of owned grazing land was 3680 acres. At the end of 1926, 720 acres of grazing land contracted for purchase was allowed to revert.

Livestock Inventories:		Jan. 1, 1927	Purchases	Sales	Losses	Dec. 31, 1927.
Cows,	No. Head	98	41	30	2	106
Heifers, 2's	No. Head					15
Heifers, 1's	No. Head	16			1	43
Bulls	No. Head	3				3
Calves	No. Head		41			
Steers, 1's	No. Head					42
Steers, 2's	No. Head	5		2	3	--
Steers, 4's	No. Head	1			1	
Totals		123	82	32	7	209

One cow was butchered for home use. The calf crop was 49 head or 50 per cent. Five of the calves dropped were lost. The ages of all classes of cattle were

advanced within the year as shown under Ranch Number 1. During 1926, 85 head of steers consisting of yearlings, two's and three's were sold, together with all steer calves. This accounts for the few steers on hand January 1, 1927. The calf crop in 1926 was 52 per cent.

Investment	Jan. 1, 1927	Dec. 31, 1927.
Land and Improvements	\$22,864	\$22,557
Machinery and Equipment	1,735	1,535
Range Cattle	5,110	8,127
Hogs	300	110
Horses	700	700
Cash crops on hand	272	77
Feed	1,281	2,169
Totals	<u>\$32,244</u>	<u>\$35,273</u>

The inventory value of cattle as shown on December 31, 1927, does not reflect the more favorable market prices as explained under Ranch Number 1. Had the prevailing market prices been reflected, the inventory value would have been \$13,590 instead of \$8,127.

On January 1, 1926, the total investment was \$41,270 and on December 31, 1926 it was \$32,244 as shown on January 1, 1927. The decrease during 1926 was due to reversion of land and sales of cattle.

The real estate indebtedness on January 1, 1926, was \$7,380. On January 1, 1927 it was \$4,500 due to reversion of the contracted land and was not decreased during 1927. The cattle indebtedness on January 1, 1926 was \$5,300. On January 1, 1927 it was \$4,000 having been reduced \$1,300. On December 31, 1927 the cattle indebtedness had been further reduced to \$3,000. The rate of interest on real estate loans was 6 per cent. On the cattle loans the rate of interest was 9 per cent.

Crops Produced in 1927:	Acres	Total Yield	Amounts fed to:	
			Cattle	Hogs
Millet, hay	50	75 tons	15 tons	
Grain, hay (1926 crop)			45 tons	
Oats	50	2880 bu.	200 bu.	175 bu.
Speltz	45	525 bu.	140 bu.	175 bu.
Barley	16	400 bu.		180 bu.
Screenings (purchased 1926)			12 tons	2 tons
Straw (grain crops)		100 tons	75 tons	10 tons
				bedding
Corn	45	Grazed by	Cattle	and Hogs
Wheat	61	670 bu.		
Millet seed	2	20 bu.		
Total	<u>277</u>	acres		

In 1926, the total crop acreage was 216 acres consisting of 80 acres of barley, 40 acres of oats, 56 acres of wheat, and 40 acres of flax. The yields were 60 bushels of wheat, 100 bushels of flax and 50 tons of grain hay from the barley and oat acreage. This signifies a poor crop year in 1926.

Ranch Receipts in 1927:

Cash sales of:

Receipts

Range Cattle	\$2325	
Hogs	625	
Wheat	654	
Flax	209	
Hail insurance on crops	103	
Total		\$3916

Increased inventories of:

Range Cattle	\$3017	
Hogs(minus)	<u>-190</u>	
Net increase all livestock		2827
Feed	888	
Cash Crops (minus)	<u>-195</u>	
Net increase in feed & cash		693
Total Receipts (crops)		<u>\$7436</u>

In 1926, the cash sale of range cattle was \$7618, hogs \$2579, horses \$300. No crops were sold, making a total of cash receipts of \$10,497. The inventory of cattle in 1926 decreased \$4871, hogs decreased \$700, and horses decreased \$100 making a total decrease in livestock inventories of \$5671, as compared to an inventory increase of \$2827 in 1927. Feed and cash crops decreased in 1926 inventories \$351 as compared to an inventory increase of \$693 in 1927.

Ranch Expenditures in 1927:

Cash Operating Expenses:

Feed Bought	\$263	
Labor incl. board, $6\frac{1}{2}$ mo.	448	
Leased Land	45	
Taxes	442	
Gas & Oil	159	
Seed	100	
Miscellaneous	<u>158</u>	
Total Cash Expense		\$1615
Depreciation on Imprv. & Mach.	858	
Value Unpaid Family Labor	<u>270</u>	
Total Operating Expenses		\$2743
Range Cattle Purchased		3690
Total all Expenses		<u>\$6433</u>

Ranch Income:

Total Ranch Receipts	\$7436	
Total Ranch Expenses	<u>6433</u>	
Ranch Income		\$1003
Operators labor		<u>780</u>
Return on Investment(\$32,244)		223
% Return on Investment(\$223 divided by \$32,244)		7%

In 1926, the cash operating expense was \$1802 as compared to \$1615 in 1927. The difference was due to greater use of hired labor and tractor expense, even though the crop acreage was smaller and the yields were considerably less. The only livestock purchase in 1926 was \$150 for horses.

The difference between Total Ranch Receipts and Total Ranch Expense in 1926 was

August 1881

Wm. H. Burleigh

1881

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\$919. After deducting the Operator's Labor only \$139 remained as Return on Ranch Investment of \$41,270 or 0.3 per cent as compared to 0.7 per cent in 1927.

Suggestions for Reorganization and Operation

Livestock. The situation on this ranch for feed production does not seem to justify an effort to raise hogs for market. The breeding herd may be increased to 150 cows. By running the breeding herd in pasture and conditioning of bulls the calf crop may be increased to 80 per cent. This situation seems conducive to carrying steers and spayed heifers to three years old, if additional range can be leased at low cost or free range can be used.

Cropping System. The acreage of farming land can be increased to 300 acres. Following is a suggested cropping system designed to provide winter feed for cattle but no cash crops; 75 acres of corn; 75 acres of oats or speltz; 75 acres of sweet clover and 75 acres of grain hay or millet. The yields from the above crops rotated in the above order may be expected to average three-fourths ton of roughage per acre and 25 bushels of oats per acre. This will provide 170 tons of hay and corn fodder, 1875 bushels of oats and 50 tons of oat straw. The breeding herd including replacement heifers would require approximately 170 tons of roughage, leaving 50 tons for the use of other cattle and horses. The grain to be used for wintering calves, thin cows and for horses.

Returns to be Expected:

Cattle Sales:

55 three year old steers at \$100 per head	\$5500	
27 three year old spayed heifers at \$80 per head	2160	
25 dry cows at \$60 per head	<u>1500</u>	
Total		\$9160
Approximate total expenses based on two years actual operations		<u>3500</u>
Receipts less Expenses		\$5660
Receipts less Expenses in 1926, actual	\$919	
Receipts less Expenses in 1927, actual	1003	
Average for two years, 1926-27		\$ 960

Ranch Number 3. This ranch is an example of the large type ^{cattle} outfits in this region that are located long distances from the railroads and controlling large acreages of grazing land.

A majority of these large scale operators are particularly well qualified to handle cattle. The low rental charge of grazing land on many of these ranches makes it desirable for the operators to utilize this cheap range to the fullest extent. Because of distances from railroad, topography and soil conditions and the personal inclinations of the operators themselves, it does not seem advisable to suggest a diversified system of ranching with cash crops or hogs as important enterprises. However, with a favorable outlook for sheep, many of these operators may well consider adding a band of sheep provided suitable range is available.

Ranches of this type are adapted to localities having a relative small proportion of good farming land. Usually the available farming land can be used to best advantage for the production of winter feed for livestock.

Land:	Farm land	Hay land	Grazing land	Total
Owned Jan. 1, 1927, acres	60	160	260	480
Leased land, acres			19,080	19,080
Acquired and used in 1927, acres	<u>15</u>	<u>200</u>	<u>665</u>	<u>880</u>
Totals, acres	75	360	20,005	20,440

The 19,080 acres of grazing land was leased at 6¢ per acre per year for a period of five years. One hundred head of cattle were carried on the national forest for six months. No free range was used. In 1926, the amount of leased grazing land operated was 9,280 acres. The farming land operated in 1926 was the same as that shown as owned on January 1, 1927. The purchased land in 1927 cost \$11,000, or \$12.50 per acre and was a cash transaction.

Livestock Inventories:		Jan. 1, 1927	Purchases	Sales	Losses	Dec. 31, 1927
Cows,	No. Head	122	163	86	4	338
Heifers, 2's	No. Head	52	93	--	-	---
Heifers, 1's	No. Head					92
Bulls,	No. Head	3	6	2		7
Calves,	No. Head			2		
Steers, 1's	No. Head	123	13			95
Steers, 2's	No. Head	117	95	22	2	136
Steers, 3's	No. Head	49	67	116		188
Steers, 4's	No. Head	5		5		
Heifers, spayed 1's	No. Head		12	4		
Heifers, spayed 2's	No. Head					8
Heifers, spayed 3's	No. Head		12	12		
Totals		<u>471</u>	<u>461</u>	<u>249</u>	<u>6</u>	<u>864</u>

Two cows were butchered for home use. The calf crop was 223 head or 81 per cent from the total of 285 cows on hand during the breeding season. The death loss on calves was 41 head leaving a calf crop of 67 per cent saved. The ages of cattle were advanced within the year as shown under the ranches Numbers 1 and 2. The number of cattle on hand January 1, 1926, was 470 head, including 100 breeding cows. During 1926, 157 head of calves and young steers were bought. The calf crop in 1926 was 93 per cent. The sales in 1926 consisted of 249 head of which 103 were calves, 70 were three year old steers, 55 were three year old spayed heifers and the remainder were dry cows.

Investment:	Jan. 1, 1927	Dec. 31, 1927.
Land and Improvements	\$24,356	\$35,589
Machinery and Equipment	2,303	2,135
Range Cattle	20,362	38,722
Horses	1,000	1,300
Feed	2,930	5,470
Totals	<u>\$50,951</u>	<u>\$83,216</u>

The inventory of cattle as shown on December 31, 1927, does not reflect the more favorable prices of cattle as explained under ranches Numbers 1 and 2. Had the prevailing prices been reflected the inventory value would have been \$61,398 instead of \$38,722.

On January 1, 1926, the total investment was \$51,486 and on December 31, 1926, it was \$50,951 as shown on January 1, 1927. The decrease consisted largely of items of depreciation.

There was no real estate indebtedness in 1926. On December 31, 1927, the real

estate indebtedness was \$2300 and the rate of interest was $5\frac{1}{2}$ per cent. On Jan. 1, 1926, the indebtedness on cattle was \$7,000 at 10 per cent interest. During 1926, \$4,000 additional at 8 per cent was borrowed on cattle and the entire \$11,000 was paid by December 31, 1926. In January, 1927, \$40,000 was borrowed at 8 per cent, and \$20,000 of the loan was paid before December 31, 1927. The cattle debt on December 31, 1927 was \$20,000.

Crops Produced in 1927:	Acres	Total Yield	Amount fed to Cattle
Wild hay	400	600 tons	415 tons
Grain hay (1926 crop)			50 tons
Millet hay	20	25 tons	
Grain hay (1927 crop)	50	25 tons	
Corn	10	100 bu.	
Oats	50	1100 bu.	825 bu.
Corn fodder	40	Grazed by	Cattle
Cottonseed cake(bought in 1926)			13 tons
Total acres	<u>570</u>		

In 1926, the total crop acreage was 195 acres consisting of 140 acres of native hay and 55 acres of grain hay. The yields were 140 tons of wild hay and 45 tons of grain hay. In 1926, 5 tons of cottonseed cake was fed to calves.

Ranch Receipts in 1927:

Cash Sales of:		
Range Cattle		\$20,465
Increased Inventories of:		
Range Cattle	\$18,360	
Horses	300	
Total increase in all livestock		18,660
Feed		2,540
Total Ranch Receipts		<u>\$41,665</u>

In 1926, the cash sale of range cattle was \$11,669, horses \$640 and receipts of \$625 for road work. Old machinery to the amount of \$125 was sold making total cash receipts of \$13,089 in 1926, as compared to the above \$20,465. The inventory of cattle in 1926 increased \$428 and the inventory of horses decreased \$640 making a net decrease in all livestock inventories of \$212. The inventory of feed crops in 1926, increased \$83. The Total Ranch Receipts in 1926 was \$13,047 as compared to \$41,665 in 1927.

Ranch Expenditures in 1927:

Cash operating expenses:		
Feed bought	\$1392	
Labor, incl. board 22 months	1547	
Leased Land	1145	
Forest fees	60	
Taxes	625	
Gas and Oil	89	
Threshing and Twine	65	
Repairs on Improvements	560	
Seed	45	
Contract labor	50	
Miscellaneous	<u>80</u>	
Total cash expense		\$5,658
Depreciation on Improvements and Machinery		815
Total Operating Expense		\$6,473
Range Cattle purchased		22,218
Horses purchased		<u>500</u>

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Total Livestock purchases	\$26,518
Total	\$32,991
Total Ranch Receipts(41,665)less Total Ranch Expenses(32,991)	8,674
Less Operator's Labor	780
Return on Total Ranch Investment (50,951)	\$ 7,894
Per Cent Return on Ranch Investment	15.5%*

(*See Page 18A)

In 1926, the cash operating expense was \$3215. The \$2500 increase in operating expense in 1927 over 1926 was due to the following increases: labor \$800; land leases \$500, feed purchased \$400, taxes \$400 and repairs \$400. These increases were due to the larger number of cattle handled in 1927.

The difference between the Total Ranch Receipts and the Total Ranch Expense in 1926 was \$4554. After deducting Operator's Labor of \$780, \$3774 remained as Return on Ranch Investment of \$51,486 or 7.3 per cent as compared to 15.5 in 1927.

Suggestions for Reorganization and Operation

Livestock. The distance from railroad and the large scale cattle operations in this instance eliminates the advisability of attempting to produce cash crops or hogs for market. The breeding herd may be held at 300 cows which would necessitate topping out 60 replacement heifers each year. Heifers to calve at three years old. An 80 per cent calf crop can be expected. The cow herd would require at least 12 bulls. This situation is well adapted to producing three year old steers and spayed heifers for market. The amount of land used in 1927 is sufficient to carry the approximate 950 head of cattle that would result from the stated plan of operation.

Cropping System. The acreage of farming land may be increased to 270 acres. A suggested cropping system is: 90 acres of corn, 90 acres of grain hay, 90 acres of sweet clover. The wild hay land is 400 acres. The yields from the above crops and hay land may be safely estimated as follows: 90 tons of corn fodder, 90 tons of grain hay, 90 tons of sweet clover hay and 350 tons of native hay. The suggested breeding herd including the replacement heifers would require 385 tons of roughage. The remaining 235 tons of roughage would be available for horses, steers and spayed heifers of various ages. The wild hay land on this ranch is especially good, being located in creek flats that receive the run-off from adjoining land.

Returns to be Expected.

50 dry cows	@ 60.00 per head	\$3000	
115 steers, 3's	@ 100.00 per head	11500	
50 heifers 3's, spayed	@ 80.00 per head	4640	
Total			\$19,140
Approximate Total Operating Expense based on 1927 Actual Operations and allowing \$1250 for the purchase of grain, feed, included.			7,000
Receipts less Expenses to be expected			\$12,140
Receipts less Expenses in 1926, actual	\$4554		
Receipts less Expenses in 1927, actual	8674		
Average for 1926 and 1927			\$ 6,614

* The per cent return on investment is computed on the total investment as of January 1, 1927. In this particular case the total profits were made, not only on the original investment of \$50,951 but also on the additional investment of \$32,265, which was made early in 1927.

INVESTMENT AND NET RETURN ON BASIS
LAND AND STOCK PURCHASES
RANCH NO. 3.

In the early part of 1927, 880 acres of land were purchased for \$11,000. Early in the year also, 461 head of cattle were purchased for \$26,218.

The operation of the ranch including the expenses and income were conducted during the year 1927 with the full use of this land and livestock purchased. Therefore it seems desirable to include these purchases as beginning inventory investments. Consequently the inventory statement for January 1, 1927, found on page 16, would be as follows:

Land and Improvements	\$35,356
Machinery and Equipment	2,303
Range cattle	46,580
Horses	1,000
Feed	2,930
Total	<u>\$88,169</u>

The net returns shown on page 18 amounted to \$7,894. If this return is considered in relation to the larger investment of \$88,169, the percentage return on the investment is 8.9 per cent. This return probably more nearly reflects the actual business of the year than the statement on page 18.

CHARTER OF THE UNIVERSITY OF CAMBRIDGE
1231

Whereas the King of England has granted unto the University of Cambridge
that the same should have full power to elect and ordain their own
governors and officers without any interference of the King or his
justices or any other person whatsoever.

And whereas the King has also granted unto the same University
that they should have full power to receive and take all such
sums of money as shall be due to them for the maintenance of
their scholars and the repair of their houses.

And whereas the King has also granted unto the same University
that they should have full power to make and give such statutes
and ordinances as shall seeme good to them for the better
government of their scholars and the more diligent
teaching of the liberal arts.